

What is claimed is:

1. An endoscope system for providing imaging and intervention therapy comprising:

- a control module;

- a light source;

- an intervention energy source;

- a micro-endoscopic device;

- a first service cable assembly electrically connecting the control module to the light source and the intervention energy source; and

- a second service cable assembly electrically and optically connecting the light source and the intervention energy source to the micro-endoscopic device;

- the micro-endoscopic device including

- a sensor array in electrical communication with the control module,

- an optical probe in optical communication with the second service cable assembly and the sensor array, and

- an object lens in optical communication with the optical probe;

- wherein the light source is activated by the control module to emit a series of light pulses, the second service cable assembly conducts the light pulses to the optical probe, the optical probe directs the light pulses to a target area, the object lens collects light reflected from the target area, the optical probe conducts the reflected light to the sensor array, and the sensor array transmits an image of the target area to the control module, and wherein the control module is operable to activate the intervention energy source to emit intervention energy which is conducted to the target area by the second service cable assembly and the optical probe.

2. The endoscope system of claim 1 wherein the control module comprises:

- a video monitor;
- system power supplies; and
- a system processing and control electronics unit.

3. The endoscope system of claim 2 wherein the system processing and control electronics unit comprises:

- a memory and
- software stored in the memory, the software controlling the video monitor, the system power supplies, the intervention energy source and the micro-endoscopic device.

4. The endoscope system of claim 1 wherein the light source comprises a plurality of flashtube assemblies, each of the flashtube assemblies including:

- a xenon flashtube having an output face;
- a color separation filter disposed intermediate the output face of the flashtube and the second service cable assembly.

5. The endoscope system of claim 4 wherein the light source comprises first, second and third flashtube assemblies, the color separation filter of the first flashtube assembly is a red filter, the color separation filter of the second flashtube assembly is a green filter and the color separation filter of the third flashtube assembly is a blue filter.

6. The endoscope system of claim 5 wherein each of the flashtube assemblies also includes a light focus optic disposed intermediate the color separation filter and the second service cable assembly.

7. The endoscope system of claim 5 wherein the second service cable assembly comprises:

a conduit segment; and

an input segment including a trifurcated fiber optic conduit having three input ends, a one of the input ends being in optical communication with each of the flashtube assemblies.

8. The endoscope system of claim 7 wherein the trifurcated fiber optic conduit multiplexes the light output of the flashtube assemblies to produce a single light output to the conduit segment.

9. The endoscope system of claim 1 wherein the second service cable assembly comprises:

an optical conduit including

a fiber optic bundle defining a light path and

an infrared filter disposed within the light path; and

an electrical conduit.

10. The endoscope system of claim 9 wherein the light source emits ultra violet light and the optical conduit also includes an ultra violet filter, the ultra violet filter being movable from an imaging position, within the light path, to a intervention position, outside of the light path.

11. The endoscope system of claim 10 wherein the micro-endoscopic device comprises:

an optical probe;

a sensor array; and

a UV filter disposed between the optical probe and the sensor array for protecting the sensor array from the intervention energy.

12. The endoscope system of claim 5 wherein the second service cable assembly comprises:

a conduit segment; and

an input segment including a quad-furcated fiber optic having first, second, third and fourth input ends, the first, second and third input ends being in optical communication with the first, second and third flashtube assemblies, respectively, the fourth input end being in optical communication with the intervention energy source.

13. The endoscope system of claim 12 wherein the intervention energy source is a therapeutic laser unit.

14. The endoscope system of claim 13 wherein the input segment also includes a mechanical fail-safe shutter disposed between the laser unit and the fourth input end, the shutter being in electrical communication with the control module, whereby the control module maintains the shutter in a closed position except when intervention therapy is administered.

15. The endoscope system of claim 13 wherein the micro-endoscopic device comprises:

an optical probe; and

a sensor array having a shutter in electrical communication with the control module, the shutter being disabled in a closed position when intervention therapy is administered.

16. The endoscope system of claim 13 wherein the control module provides sequential control of the flashtube assemblies and the laser unit for imaging and for intervention therapy.

17. The endoscope system of claim 4 wherein the light source comprises first, second, third and fourth flashtube assemblies, the color separation filter of the first flashtube assembly is a red filter, the color separation filter of the second flashtube assembly is a green filter, the color separation filter of the third flashtube assembly is a blue filter, and the color separation filter of the fourth flashtube assembly is in the visible range of the color spectrum.

18. The endoscope system of claim 17 wherein the second service cable assembly comprises:

- a conduit segment; and

- an input segment including a trifurcated fiber optic conduit and a bifurcated fiber optic conduit, the trifurcated fiber optic conduit having first, second and third input ends in optical communication with the first, second and third flashtube assemblies, respectively, the bifurcated fiber optic conduit having fourth and fifth input ends, the fourth input end being in optical communication with the fourth flashtube assembly and the fifth input end being in optical communication with the intervention energy source.

19. The endoscope system of claim 18 wherein the control module comprises:

- a video monitor;

- system power supplies; and

- a system processing and control electronics unit that activates the fourth flashtube assembly to paint the target area onto the video monitor.

20. The endoscope system of claim 18 wherein the intervention energy source is a therapeutic laser unit and the system further

comprises an optical connector disposed between the fifth input end and the laser unit, the optical connector comprising turret-mounted optics providing selection of different laser effects.

21. An endoscope system for providing imaging and intervention therapy comprising:

- a control module including

- a video monitor and

- a control electronics unit

- a light source including first, second and third flashtube assemblies, each of the flashtube assemblies including

- a xenon flashtube activated by the control electronics unit to emit light and

- a band-pass filter passing a narrow frequency band of the light emitted by the flashtube, the band-pass filters of the first, second and third flashtube assemblies each passing a different frequency band of light;

- an intervention energy source;

- a micro-endoscopic device including

- an optical probe and

- a sensor array;

- a first service cable assembly electrically connecting the control module to the light source and the intervention energy source; and

- a second service cable assembly electrically and optically connecting the light source and the intervention energy source to the micro-endoscopic device;

- wherein the light source is activated by the control electronics unit to emit a series of light pulses, the second service cable assembly conducts the light pulses to the optical probe, the optical probe directs the light pulses to a target area, light reflected from the target area is

collected by the optical probe, the optical probe conducts the reflected light to the sensor array, and the sensor array transmits an image of the target area to the video monitor, and wherein the control electronics unit is operable to activate the intervention energy source to emit intervention energy which is conducted to the target area by the second service cable assembly and the optical probe.

22. An endoscope system for providing imaging and intervention therapy comprising:

- a control module;

- a light source in electrical communication with the control module;

- an intervention energy source in electrical communication with the control module;

- a micro-endoscopic device including

- an optical probe in optical communication with the light source and the intervention energy source, and

- a sensor array in optical communication with the optical probe and in electrical communication with the control module;

- wherein the light source is activated by the control module to emit a series of light pulses, the optical probe directs the light pulses to a target area, light reflected from the target area is collected by the optical probe, the optical probe conducts the reflected light to the sensor array, and the sensor array transmits an image of the target area to the control module, and wherein the control module is operable to activate the intervention energy source to emit intervention energy which is conducted to the target area by the optical probe.